REMARKS

New claims 31-36 have been added so that claims 1-36 are now in the application. New claims 31-36 read upon Species DA (underlying layer is a write gap layer). Claims 5-8, 10-18 and 27-30 have been withdrawn from consideration.

Claims 25 and 26 were objected to as being of improper dependent form for failing to further limit the subject matter of a previous claim. Claim 25 has been amended to recite:

> "removing the shaping layer after leaving a remaining portion of the ferromagnetic material layer on the side surface of the shaping layer as said pole tip."

The Applicants submit that this amendment to claim 25 obviates the confusion between claim 25 and claim 19.

Claim 4 was rejected under 35 USC 112, second paragraph, as being indefinite. The limitation "the first shield layer" has been amended to --a first shield layer-- and "the first pole piece layer" has been amended to recite --a first pole piece layer--.

Claim 1 was rejected under 35 USC 103(a) as being unpatentable over Santini in view of Trumpp. Claim 1 is distinguished over these references by reciting:

> "forming a shaping layer on an underlying layer wherein the underlying layer has a flat surface and wherein the shaping layer has a side surface and a top surface;
>
> depositing a ferromagnetic material layer on the underlying layer and on the side and top surfaces of the shaping layer; and
>
> removing first and second portions of the ferromagnetic material layer from the underlying layer and the top surface of the shaping layer respectively leaving a remaining portion of the ferromagnetic material layer on the side surface of the shaping layer as said pole tip."

This structure is shown in Applicants' Figs. 12C, 12D and 12E wherein in Fig. 12C the shaping layer 300 and 302 is formed on an underlying layer 102 wherein the underlying layer has a flat surface and wherein the shaping layer has a side surface 308 and 306 and a top surface; in Fig. 12D ferromagnetic material is deposited on the underlying layer 102 and on the side and top surfaces of

the shaping layer; and in Fig. 12E first and second portions of the ferromagnetic material layer are removed from the underlying layer 102 and the top surface of the shaping layer respectively leaving a remaining portion 100 of the ferromagnetic material layer on the side surface of the shaping layer as the pole tip. In support of his rejection the Examiner states:

> "Santini teaches a process of fabricating a write head comprising steps of: forming a shaping layer (188) on an underlying layer (P1), wherein the photoresist layer is photopatterned with an opening (including top and side surface) as shown in Fig. 14G; depositing a ferromagnetic material (seed layer of Cu or NiFe, col. 3, lines 10-43) covered the shaping layer and the underlying layer as shown in Fig. 14H; removing the shaping layer and removing unwanted portion of the ferromagnetic material to form the pole tip as shown in Figs. 14I and 14J (see also col. 8, line 5-29)."

The Applicants disagree with the Examiner that ferromagnetic material (seed layer of Cu or NiFe, col. 3, lines 10-43) is deposited to cover Santini's shaping layer which shaping layer is the photoresist 188 in Fig. 14G of Santini. In column 3, lines 11-14, Santini states:

> ". . . . .Before the photolithographic patterning, however, a seed layer of copper (Cu) is sputter deposited on the wafer to provide a return path for the electroplating. . . ."

Accordingly, the seed layer, referred to by the Examiner, does not cover Santini's shaping layer 188, but, in contrast, covers the underlying layer after which the shaping layer 188 is formed, as shown in Fig. 14G. It should be noted that in Fig. 14H of Santini the shaping layer has been removed. After plating P2 in Fig. 14H only the seed layer portion on the underlying layer is removed with the seed layer still located below the pole tip 100. Further in support of his rejection the Examiner states:

> " . . . . According to Figs 1A and 1B of Trumpp et al. show a process of removing first and second portions of the material from an underlying layer (substrate) and top surface of the shaping layer (polymeric layer) respectively leaving a remaining portion (SiN) of the material on the side surface of the shaping layer in order to form a microwidth of the pole tip portion (see also, col. 4, line 53 to col. 5, line 10). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a process of fabricating a pole tip of Santini by removing portions of the material from the underlying layer and the shaping layer as taught by Trumpp et al. in order to form a microwidth of the pole tip portion."

The Applicants maintain that one skilled in the art would not be led to modify the Santini teaching by the Trumpp teaching in order to come up with Applicants' invention. The Examiner has not addressed how ferromagnetic material is deposited on the side and top surfaces of Santini's shaping layer 188. Santini does not deposit any ferromagnetic material on the side surface of the shaping layer 188 and Trumpp does not deposit ferromagnetic material on the side surface of his shaping layer (polymeric material) in Fig. 1A, but in contrast deposits a silicon oxide (SiO_2) thereon. The silicon oxide (SiO_2) material will not form a pole tip even after its removal as shown in Fig. 1B of Trumpp.

Claims 2-4 and 9 were rejected under 35 USC 103(a) as being unpatentable over Santini in view of Trumpp and further in view of Chen. These claims are distinguished over these references for the same reasons as given in support for claim 1. Claim 2 is further distinguished by reciting that the depositing is done by ion beam sputtering at an angle to a normal to said flat surface. This is shown in Applicants' Fig. 12D. In support of his rejection the Examiner states:

> "However, Santini, modified by Trumpp et al., does not teach a process of depositing the ferromagnetic material by ion beam sputtering at angle to a normal to the flat surface. Chen et al. teach a process of fabricating a magnetoresistive head including a process of depositing P1 and P2 layers of ferromagnetic material by ion beam sputtering at angle to a normal to the flat surface of the structure as shown in Figs. 8 and 9 in order to control the thickness of the pole tips (see also col. 7, line 61 to col. 8, line 3). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify a process of depositing the ferromagnetic material of Santini, modified by Trumpp et al., by depositing the ferromagnetic material with ion beam sputtering process as taught by Chen et al. in order to control the thickness of the pole tips."

The Applicants respectfully disagree with the Examiner's analysis of Chen. In Fig. 7 of Chen, hard bias and lead layers 110, 130 and 150 are deposited, after which the photoresist is removed in Fig. 8. In Fig. 9, the first and second pole pieces 180 and 200 are formed. The ion beam sputtering, referred to by the Examiner, is ion beam sputtering of the hard bias and lead layers 110, 130 and 150 in Fig. 7 instead of ion beam sputtering layers P1 and P2, as referred to by the Examiner. This is supported by Chen, col. 7, line 62 to col. 8, line 3 which state:

> "FIG. 9 illustrates, in accordance with another aspect of the present invention, the reduction in severe surface topography that is achieved by using ion beam deposition to form the conductor lead structure of the MR head. By using the ion beam sputtering process, the conductor lead thickness much more closely approximates the MR element, thus, reducing the curvature of ferromagnetic layers 180 and 200. Consequently, the read error rate seen in the prior art caused by the curvature of P1 and P2 is improved."

The deposition of the hard bias and lead layers 110, 130 and 150 in Chen forms a "contiguous junction" and minimizes curvature of the first and second pole piece layers 180 and 200, as shown in Fig. 9. Claims 3, 4 and 9, which are dependent upon claim 2, are considered to be patentable over these references for the same reasons as given in support for claim 2.

Claims 19-25 were objected to as being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. These claims have been so amended and should now be in condition for allowance. Amended claim 26 is dependent upon claim 35 and should likewise now be in condition for allowance.

New claim 31, which is dependent upon claim 1, is further distinguished over the references by reciting:

> " . . . . . wherein said side surface is the only side surface of the shaping layer and commences at said flat surface of the underlying layer and extends upwardly therefrom in a direction normal thereto."

As shown in Fig. 12C, side surface 308 and 306 is the only side surface of the shaping layer that shapes the pole tip. In contrast, the shaping layer 188 in Fig. 14G of Santini has two spaced apart side surfaces that shape the pole tip.

New claim 32, which is dependent upon claim 1, is further distinguished over the references by reciting:

> "sputter depositing a ferromagnetic material layer on the underlying layer and on the side and top surfaces of the shaping layer;"

Claim 32 is considered to be patentable over the references for the same reasons as given in support for claim 2. Claims 33-36, which are dependent upon claim 32, are considered to be patentable over the references for the same reasons as given in support for claim 32.

Please note that the undersigned has a new telephone number which is **808-661-1197**.

Should the Examiner have any questions regarding this document he is respectfully requested to contact the undersigned.

Respectfully submitted,

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